

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau(43) International Publication Date
8 April 2004 (08.04.2004)

PCT

(10) International Publication Number
WO 2004/028970 A2(51) International Patent Classification⁷:

C01F

931-8577 (JP). TANAKA, Jun [JP/JP]; C/O Corporate
R & D Center, SHOWA DENKO K.K., 1-1, Ohnodai
1-chome, Midori-ku, Chiba-shi, Chiba 267-0056 (JP).

(21) International Application Number:

PCT/JP2003/012554

(22) International Filing Date:

30 September 2003 (30.09.2003)

(74) Agents: AOKI, Atsushi et al.; A. AOKI, ISHIDA & AS-
SOCIATES, Toranomom 37 Mori Bldg., 5-1, Toranomom
3-chome, Minato-ku, Tokyo 105-8423 (JP).

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

NO.2002-285334

60/416,919

30 September 2002 (30.09.2002) JP/

NO.2003-169421

9 October 2002 (09.10.2002) US

NO.2003-197672

13 June 2003 (13.06.2003) JP/

60/489,109

16 July 2003 (16.07.2003) JP✓

NO.2003-320123

23 July 2003 (23.07.2003) US

11 September 2003 (11.09.2003) JP

(71) Applicant (for all designated States except US): SHOWA
DENKO K. K. [JP/JP]; 13-9, Shiba Daimon 1-chome, Mi-
nato-ku, Tokyo 105-8518 (JP).

(72) Inventors; and

(75) Inventors/Applicants (for US only): KAYAMA, Susumu
[JP/JP]; C/O SHOWA TITANIUM CO., LTD., 3-1,
Nishinomiyamachi, Toyama-shi, Toyama 931-8577 (JP).
KOGOI, Hisao [JP/JP]; C/O SHOWA TITANIUM CO.,
LTD., 3-1, Nishinomiyamachi, Toyama-shi, Toyama(81) Designated States (national): AE, AG, AL, AM, AT, AU,
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,
CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE,
GH, GM, HR, HU, ID, IL, IN, IS, KE, KG, KR, KZ, LC,
LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,
MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC,
SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA,
UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.(84) Designated States (regional): ARIPO patent (GH, GM,
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),
Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,
ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO,
SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM,
GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— without international search report and to be republished
upon receipt of that reportFor two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.(54) Title: METAL OXIDE STRUCTURE CONTAINING TITANIUM OXIDE AND PRODUCTION METHOD AND USE
THEREOF(57) Abstract: A dye sensitized solar cell comprising, as the dye-electrode, a titanium oxide structure having an optical band gap
(hereinafter referred to as "BG") of 2.7 to 3.1 eV as calculated from absorbance measured by an integrating sphere-type spectropho-
tometer, or a metal oxide structure obtained by dry-mixing a plurality of metal oxide powder particles differing in the particle size
or a metal oxide dispersion thereof, wherein assuming that the BG of raw material metal oxide is BG0 and the BG of metal oxide
after the dry mixing is BG1, the (BG0 - BG1) is from 0.01 to 0.45 eV; and a production method thereof are provided.

WO 2004/028970 A2